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WILLIAM ALPHONSO MURRILL

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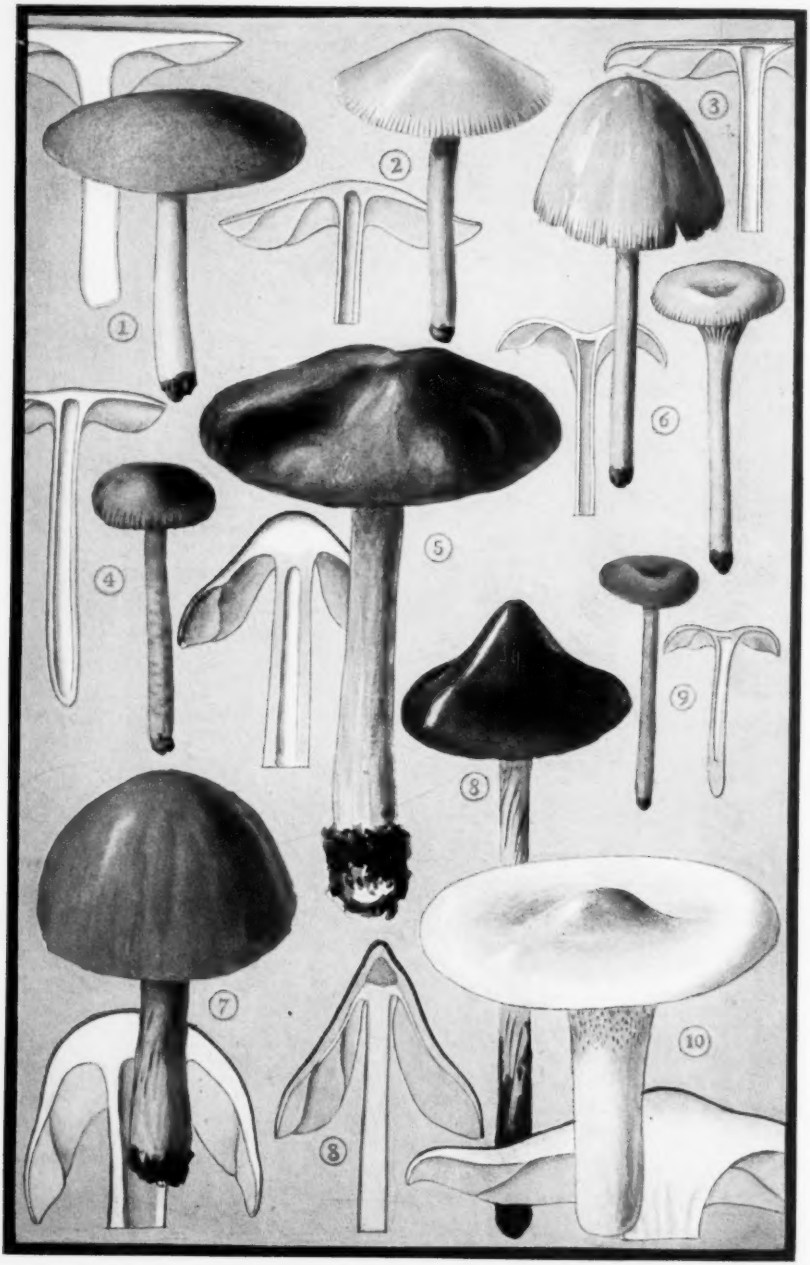

ILLUSTRATIONS OF FUNGI

MYCOLOGIA

VOL. II JULY, 1910 No. 4

ILLUSTRATIONS OF FUNGI—VII

WILLIAM A. MURRILL

The accompanying plate represents ten of the more common species of *Hygrophorus* found in the United States. The figures are drawn from the studies of Mr. George E. Morris, based upon the publications of Dr. C. H. Peck, State Botanist of New York, whose excellent monograph of the New York species appeared in his report for 1906.

The genus as ordinarily accepted is characterized by a waxy hymenium; the species are fleshy, terrestrial, often brilliantly colored, and many of them are noted for their viscidity. None of them are known to be poisonous; but some species have not yet been thoroughly investigated. Most of them are either too rare or too small to be of importance as food.

Hygrophorus pratensis (Pers.) Fries

MEADOW HYGROPHORUS

Plate 27. Figure 1. × ¾

Pileus firm, convex to expanded, often turbinate, 2–5 cm. broad; surface glabrous, not viscid, buff, tawny, white, or grayish; flesh thick, firm, white, edible, of delicate flavor; gills long-decurrent, thick, distant, often interveined, white or yellowish; spores subglobose to ellipsoid, hyaline, 6–8 × 5–6 μ; stem short, smooth, equal or tapering downward, solid or stuffed, white or subconcolorous, 3–5 × 1 cm.

This variable species is common in late summer in woods and

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pastures throughout the United States and Europe. It represents quite a different type from the bright-colored, viscid, hollow-stemmed species here figured, and was set apart by Karsten with several of its close relatives in a distinct genus.

Hygrophorus ceraceus (Wulf.) Fries

WAXY HYGROPHORUS

Plate 27. Figure 2. × ¾

Pileus thin, fragile, convex to plane, obtuse, 1–3 cm. broad; surface viscid, striatulate, pale-yellow, the color of wax; flesh concolorous; gills adnate or slightly decurrent, distant, very broad, concolorous; spores ellipsoid, hyaline, 7–8 × 4–5 μ; stem usually equal, straight, rarely flexuous, shining, concolorous, hollow, 3–8 × 0.3–0.5 cm.

This species is small, and yellow throughout, growing in groups among mosses or grasses. It is reported from Greenland to North Carolina and west to Minnesota and Ohio, and also occurs in Europe.

Hygrophorus chlorophanus Fries

SULFUR-COLORED HYGROPHORUS

Plate 27. Figure 3. × ¾

Pileus thin, fragile, convex to nearly plane, obtuse, striate and often lobed or split at the margin, 2–4 cm. broad; surface pale-yellow, rarely reddish at the center, glabrous, viscid; flesh thin, yellowish, edible; gills thin, fragile, adnexed, subdistant, ventricose, concolorous or paler; spores ovoid, hyaline, 7–8 × 4–5 μ; stem cylindric, glabrous, viscid, concolorous, hollow, 3–7 × 0.2–0.4 cm.

This species occurs commonly in damp woods from Maine to Alabama and west to Wisconsin; also in Europe.

Hygrophorus psittacinus (Schaeff.) Fries

PARROT HYGROPHORUS

Plate 27. Figure 4. × ¾

Pileus thin, convex to expanded, umbonate, striatulate on the margin, 1–3 cm. broad; surface smooth, reddish or yellow,

covered with evanescent, greenish slime; flesh white, very thin; gills adnate-decurrent, thick, broad, ventricose, yellow, tinged with green; spores ellipsoid, hyaline, 7–8 × 5–6 μ; stem cylindric, subequal, tough, viscid, concolorous, 2.5–4 × 0.3–0.4 cm.

This very striking species occurs rather rarely in pastures and open woods in the eastern United States from New England to North Carolina, and also in Europe. Its brilliant colors and the greenish slime which envelops it make it conspicuous and easily recognized. Dried specimens fade to pale-orange or yellow.

Hygrophorus puniceus Fries

RED HYGROPHORUS

Plate 27. Figure 5. × ¾

Pileus fragile, conic to subexpanded, obtuse or slightly depressed, 3–10 cm. broad; surface glabrous, viscid, not striate, scarlet, fading out with age, especially at the center; flesh white, tinged with red beneath the cuticle, mild and edible; gills slightly adnexed, broad, thick, distant, yellow, often becoming reddish; spores ellipsoid, hyaline, 8–10 × 4–5 μ; stem stout, subequal, glabrous, slightly striate, concolorous or paler, white at the base, hollow, 5–8 × 1–2 cm.

This is our largest red species of the genus. It occurs sparingly in moist woods in New York and New England, as well as in Europe, and has also been reported from Ohio and California. It is edible and very tender, although too rare to be considered for food.

Hygrophorus nitidus Berk. & Curt.

SHINING HYGROPHORUS

Plate 27. Figure 6. × ¾

Pileus thin, fragile, convex, umbilicate, 1–2.5 cm. broad; surface viscid, striatulate on the margin when moist, pale-yellow, whitish when dry; flesh thin, pale-yellow; gills arcuate-decurrent, distant, interveined, pale-yellow; spores broadly ellipsoid, hyaline, 6–8 × 5–6 μ; stem slender, fragile, viscid, concolorous, hollow, 7–10 × 0.2–0.4 cm.

This small, yellow species occurs in groups or clusters in wet places during late summer. Although edible, it is too small to

collect for food. It is reported from New England to Alabama and west to Minnesota, but it may have been confused with some forms of *Hygrophorus Cantharellus,* which it much resembles.

Hygrophorus coccineus (Schaeff.) Fries

SCARLET HYGROPHORUS

Plate 27. Figure 7. × ⅔

Pileus thin, fragile, convex to plane, obtuse, 2–5 cm. broad; surface glabrous, viscid, scarlet, fading to pale-red, and finally yellowish; flesh whitish or yellowish, edible; gills adnate or with a decurrent tooth, distant, interveined, pale-yellow or reddish; spores ellipsoid, hyaline, 6–8 × 4–5 μ; stem cylindric or compressed, glabrous, hollow, scarlet above, yellow below, 3–5 × 0.3 cm.

This brilliantly colored species occurs in moist pastures and on mossy banks in Europe and eastern North America, having been reported from Greenland to North Carolina and west as far as Minnesota.

Hygrophorus conicus (Scop.) Fries

CONIC HYGROPHORUS

Plate 27. Figure 8. × ⅔

Pileus thin, fragile, conic, usually acute, often lobed at the margin, 2–4 cm. broad; surface viscid when moist, glabrous or fibrillose, sometimes becoming rimose, some shade of red or yellow, at times tinged with green, almost always turning black on drying; flesh thin, suffused with rosy hues; gills almost free, attenuate behind, thin, rather crowded, ventricose, yellow, blackening on drying; spores ellipsoid, hyaline, 9–11 × 6–8 μ; stem equal, fibrous-striate, hollow, yellow, becoming black on drying, 3–10 × 0.3–0.7 cm.

This species is usually readily distinguished by its conic cap with acute apex, as well as by its change of color to black on drying. It is common in moist woods and grassy places from Greenland to the Bahamas, and also occurs in Europe.

Hygrophorus miniatus Fries

VERMILION HYGROPHORUS

Plate 27. Figure 9. × ¾

Pileus fragile, regular, convex to plane or umbilicate, 1–5 cm. broad, surface glabrous or minutely squamulose, hardly viscid, scarlet, rarely yellow, soon fading; flesh yellow, mild, tender, edible; gills adnate or very slightly decurrent, distant, yellow often tinged with red; spores ellipsoid, hyaline, 8–9 × 4–6 μ; stem slender, equal, glabrous, concolorous or slightly paler, stuffed or partly hollow, 2–7 × 0.2–0.4 cm.

This species is very variable in color, size, and mode of growth. It may be looked for in damp woods or swamps, and is readily noticed because of its brilliant coloring. Specimens always fade to yellow on drying.

Hygrophorus Laurae Morgan

LAURA'S HYGROPHORUS

Plate 27. Figure 10. × ¾

Pileus convex to expanded, unbonate, 5–10 cm. broad; surface viscid, white, tinged with red or brown, especially on the umbo; flesh white, edible; gills white, distant, adnate or decurrent, unequal; spores ellipsoid, hyaline, 8–9 × 5–6 μ; stem solid, white within, more or less curved, attenuate below, yellowish-white, scabrous above, 5–10 × 0.5–1 cm.

This species was originally described from Ohio by Morgan, but has since been found as far west as Kansas and as far east as Massachusetts, growing rather commonly in woods and groves during late summer and autumn. It represents a group of species distinguished from all the rest by a viscid, universal veil, which remains as an annulus or in the form of squamules at the apex of the stem. In the division of Fries' genus *Hygrophorus*, his name remains with this group and an older name, *Hydrophorus* Batt., is used for the viscid, hollow-stemmed species not furnished with a veil.

AN IMPORTANT ENTOMOGENOUS FUNGUS

H. S. Fawcett

(With Plates 28 and 29, Containing 7 Figures)

In 1896, H. J. Webber discovered a fungus parasite of the citrus whitefly and described its sterile form under the name of "Brown mealy-wing fungus (2)." It is now popularly known by the orange growers of Florida as the "Brown fungus" of the whitefly. The spread of this fungus on whitefly larvae,—(1) by means of superficial hyphae that spread over the surface of the leaves attacking every whitefly larva in their way, and (2) by means of spore-like aggregations of cells that may be carried in the air or by insects,—make this fungus one of the most important parasites of the whitefly! This fungus and the red fungus (*Aschersonia Aleyrodis*) are being introduced by orange growers into many localities in Florida with the belief that they are the most economic means yet discovered of keeping the whitefly (*Aleyrodis Citri*) under control.

Spread of the Fungus by Artificial Means

Artificial means of spreading this fungus and *Aschersonia Aleyrodis* have been developed by E. W. Berger, of the Florida Agricultural Experiment Station (12, 13). The two most commonly used are the leaf-pinning method and the spore-spraying method; the first consisting in pinning into a citrus tree fungus-bearing leaves in contact with larva-infested leaves; the second in spraying surfaces of leaves with water contaning the spores of the fungi. The latter method has been taken up quite extensively in some orange groves. This is shown by the fact that at the present time there are men in Florida who make it a regular business to spray whitefly-infested orange trees in this way, getting their supplies of fungus spores from citrus leaves on which the fungus has previously developed upon whitefly larvae. Whenever the atmospheric conditions are favorable to

the growth of these fungi, fair success in checking the whitefly has been attained.

DEVELOPMENT OF THE FUNGUS

The fungus as it develops upon a larva of the whitefly forms a chocolate-brown (No. 10, Saccardo's Chromotaxia) stroma (*pl. 28, f. 2*), which to the unpracticed eye looks like the citrus red scale (*Chrysomphalis Aonidum*). A good description is given of this stage of the development of the fungus by Webber (2) as follows: "The hyphae develop in the body of the insect, burst out around the edges of the scale, and gradually grow up over it. In the early stage they form a brown, compact layer around the edge of the larva. As the fungus develops, the hyphae entirely cover the larval scale, forming a dense, hard, and smooth stroma. The mature stroma is compressed-hemispherical, frequently having a slight depression in the apex over the center of the insect, where the hyphae come together as they spread from the edge of the scale in their development. The hyphae which make up the body of the stroma, are light brown, very tortuous, and but slightly branched. Those in the body of the insect are of similar character, but a much darker brown. From the base of the stroma a ground mycelium, or hypothallus, spreads out in all directions on the surface of the leaf, forming a compact membrane near the stroma, but becoming gradually dispersed into separate filaments." In the later development of the fungus, the separate filamants spoken of by Webber as spreading for a distance of one half inch, grow out over the entire surface of the leaf, branching only sparingly and infecting every larva present. They extend also around the edges and over the upper surface of the leaf. These filamentous hyphae are colorless to slightly tawny with age. They are only occasionally branched, forming a loose, inconspicuous mycelium over the surface of the leaf. On the upper surface of the leaf, on short lateral hyphae, are borne the sporodochia, which are 60 to 90 μ in diameter. These consist of an aggregation of conidia-like, inflated, spherical cells, 12–18 μ in diameter. From near the place of attachment of the sporodochium, there radiate 3 to 5 hypha-like appendages, which are 150–200 μ long by 6–8 μ wide, and are one- to three-septate (*pl.*

29, f. 5). This entire aggregation of spherical cells and appendages usually remains in union and functions as a spore. When abundant, these sporodochia present to the eye the appearance of a reddish-brown dust over the upper surface of the leaf (*pl. 28, f. 1*). The presence of the brown stromata may easily be known at a distance of 10 to 20 feet by this characteristic appearance. In most cases these sporodochia are found only on the upper surface, but if the lower surface of a leaf happens to be turned over for some time they will develop there also. This condition of the fungus is common in the summer and fall. The sporodochia were first noticed in the fall of 1905, and have been observed since in great abundance every year. The supposed connection of these sporodochia with the brown stromata was touched upon in 1908 (15), but only recently has the connection between the two been proved. The relation of the sporodochia to the spread of the fungus is interesting. When mature, the sporodochium with its accompanying appendages breaks off from the mycelium and remains upon the surface, apparently held lightly by the appendages. The inflated cells make it light, so that when once detached it blows about easily, and on coming in contact with a fairly rough surface it tends to hold fast to it. It seems probable that the appendages may also serve to hold the sporodochia to bodies of large insects that may drag them from one part of the tree to another.

GERMINATION OF SPORODOCHIA

These *Aegerita* sporodochia when germinated in hanging-drop cultures of sterile water and in 5 per cent. glucose solution, were seen to produce hyphae (*pl. 28, f. 3, 4*) identical with those which compose the brown stromata on the whitefly larvae. When germinating, the first hyphae grow out either from the sporodochia or from the ends of the appendages. These branch rather sparingly, but in a few days, in 5 per cent. glucose solution, form a network by the intercrossing of the branches (*pl. 28, f. 4*).

INOCULATIONS OF WHITEFLY LARVAE

Four different attempts were made to inoculate larvae of whitefly with these sporodochia, three of which were successful. One

of these is here given in detail. The sporodochia were carefully picked off one by one under the compound microscope. A camel's hair brush moistened with water containing these sporodochia was drawn over whitefly-infested leaves on trees at Gainesville, Fla., August 11, 1909. No brown fungus could be found nearer than one and one half miles from this place. In 9 days, the young larvae showed effects of fungus infection. In 16 days, the initial stage of the stromata were evident, bursting through the edges of the larvae (*pl. 29, f. 7*). In a few weeks, the typical brown stromata were produced, but no sporodochia were yet evident. In two or three months, the hyphae had grown around to the upper surface of the leaves and had produced the *Aegerita* sporodochia. On more than a hundred trees not inoculated no brown fungus developed.

Because of the economic importance of this fungus, it has been suggested in Science that it be designated as *Aegerita Webberi* for convenience until the perfect stage is found. The form of the hyphae strongly suggest relationship to the Hypochnaceae of the basidiomycetous fungi, but as yet the basidia spores have not been found. A technical description follows.

Aegerita Webberi sp. nov.

Sporodochia superficial, subglobose, whitish when young, turning to reddish-brown when mature, 60–90 μ in diameter, bearing three to five appendages; conidia-like cells globose to ellipsoid, hyaline, inflated, thin-walled, 12–18 μ in diameter, persistent, hanging together in chains and clusters; appendages 3 to 5 in number, straight, thick-walled, 2- to 3-septate, rounded at apex, 150–200 μ long by 6–8 μ at the base, narrowing to 4–6 μ near the apex, arising from within near the base of the sporodochium. Fertile hyphae spreading, colorless to slightly tawny with age, sparingly branched, distantly septate, forming a loose mycelium on the upper surface of the leaf. Stromata pustular, chocolate-brown, smooth, with depressed top when young, becoming convex to flat when mature, 0.5–2 mm. in diameter, composed of intercrossing thick-walled hyphae; margin of stroma membranous, gray to tawny, extending 5–15 mm. and giving rise to a wide-spreading mycelium.

Found on larvae of *Aleyrodes Citri* R. & H. and on *A. nubifera* Berger, on the under surface of citrus leaves.

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EXPLANATION OF PLATES XXVIII AND XXIX

FIG. 1. Sporodochia of *Aegerita Webberi* on upper side of an orange leaf. × ½.

FIG. 2. Brown stromata of *Aegerita Webberi* on lower side of same leaf indicating position of the whitefly larvae that have been parasitized. The three pustules that show white in the figure are of *Aschersonia Aleyrodis* Webber. × ½.

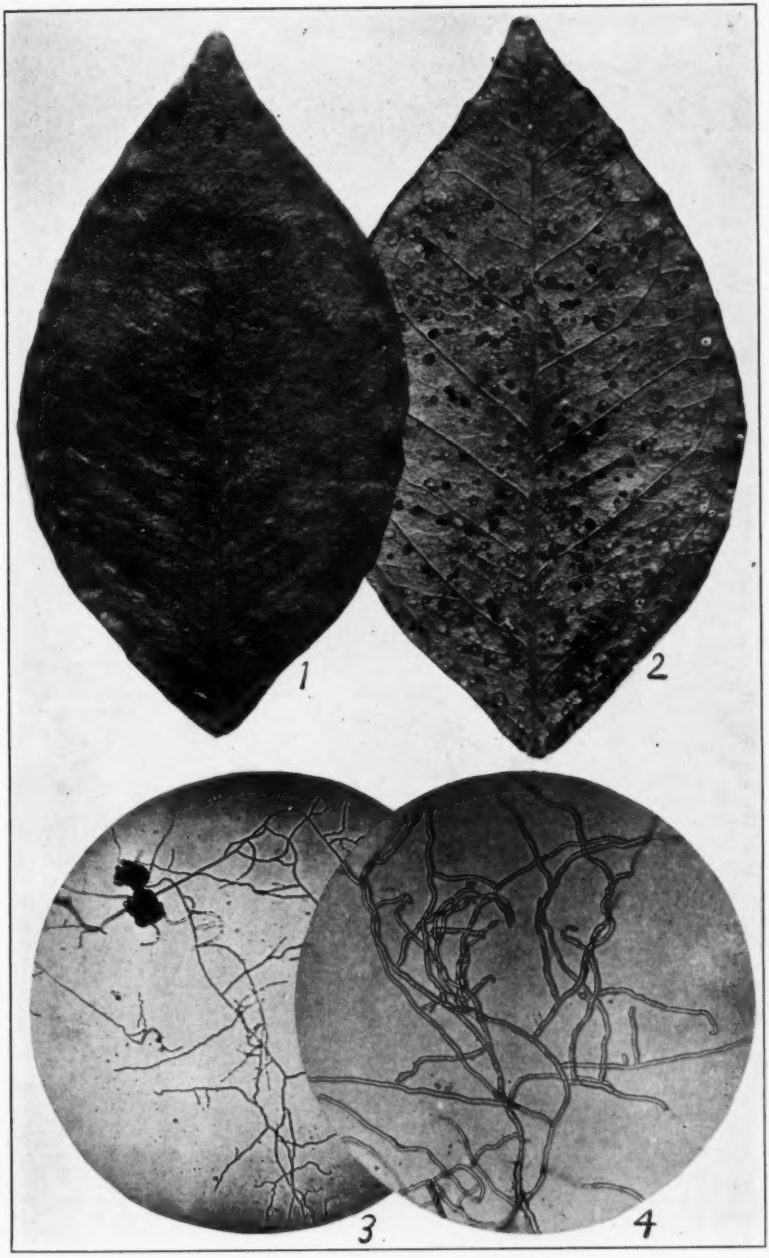
FIG. 3. Two sporodochia of *Aegerita Webberi* germinated in 5 per cent. glucose solution showing growth of mycelium. × 75.

FIG. 4. Portion of a mycelium in a hanging-drop culture more highly magnified, showing the intercrossing of the hyphae. × 150.

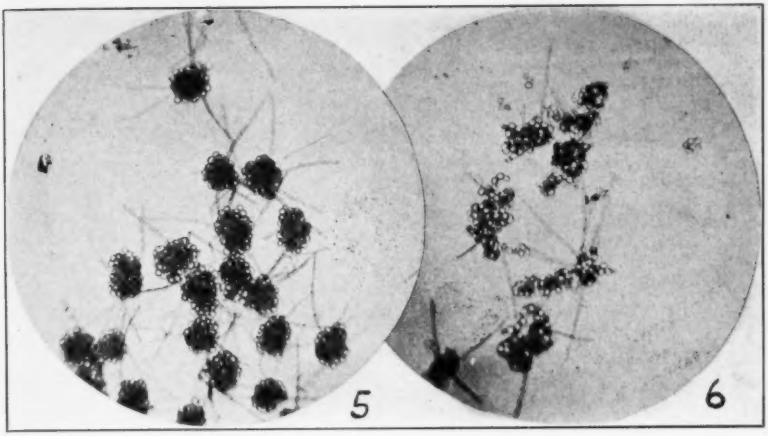
FIG. 5. Sporodochia of *Aegerita Webberi* mounted in water showing conidia-like cells and appendages. × 80.

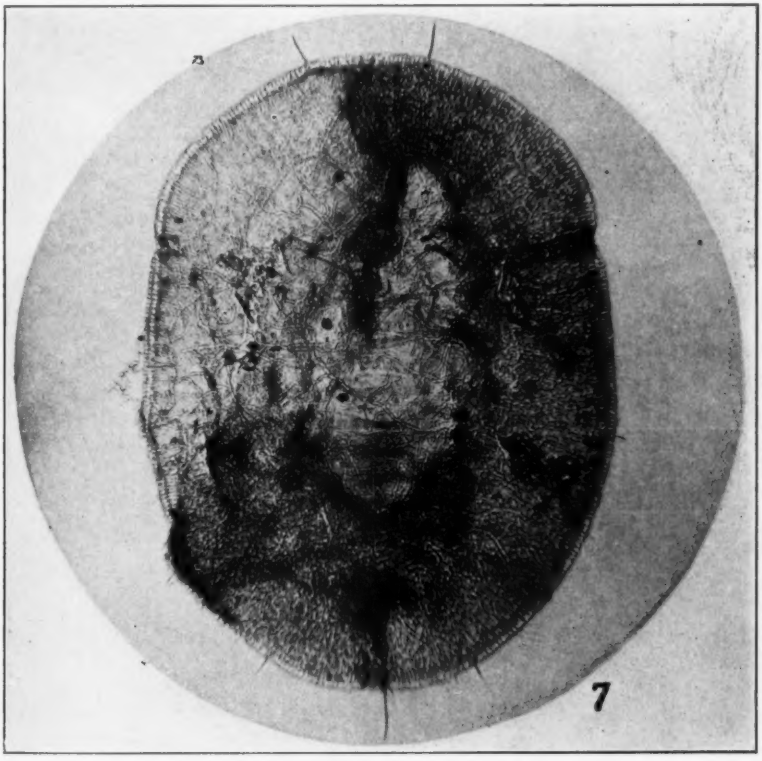
FIG. 6. Same sporodochia broken up under a cover glass to show the clusters and chains of cells. × 80.

FIG. 7. Larva of *Aleyrodes Citri* parasitized by inoculation with sporodochia of *Aegerita Webberi.* Near the middle and toward one side, the mycelium of the fungus may be seen very clearly.



AEGERITA WEBBERI FAWCETT





AEGERITA WEBBERI FAWCETT

TROCHILA POPULORUM DESM.

C. W. Edgerton

In a recent article, Potebnia* has called attention to the probable connection between *Marssonia Castagnei* (Desm. and Mont.) Sacc., a common fungus on certain species of *Populus,* and the discomycete, *Trochila Populorum* Desm. This connection had previously been suggested to him by Jaap. However, Potebnia is of the opinion that the discomycete is a *Pseudopeziza* rather than a *Trochila.* He arrived at this latter conclusion mostly from the similarity of artificial cultures obtained from *Marssonia Castagnei* spores, to cultures obtained from *Pseudopeziza Salicis,* the perfect stage of *Gloeosporium Salicis.* His material of the perfect stage of the *Populus* fungus was too scanty to be studied.

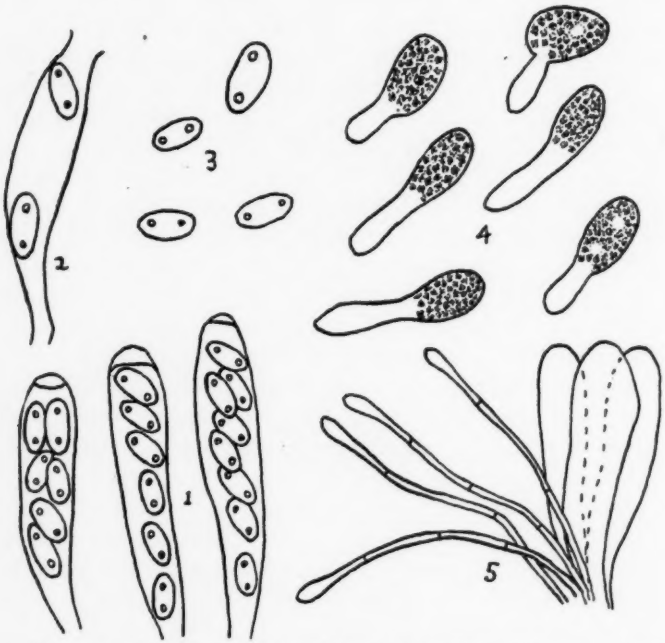
During the past three years, I have had this fungus under observation, trying to connect the *Marssonia* stage with the perfect form. While the study is not complete, and the connection between the *Marssonia* and the *Trochila* is not absolutely proven, it is impossible to carry on the study further on account of being out of the region where the fungus grows, and it is thought best to publish the observations as far as made.

The study of the poplar *Marssonia* was commenced in the summer of 1907, at Ithaca, New York. The fungus is very common in that region on *Populus alba,* forming numerous small dead spots on the leaves. The acervuli develop in abundance on the upper side of the spots. Two sorts of conidia develop in the spots, the large two-celled spores typical of *Marssonia,* and some small, somewhat cylindric to ellipsoid, one-celled spores. The small spores have since been found by Potebnia and are illustrated in his article.

Pure cultures were obtained from the *Marssonia* spores on sterilized bean pods in tubes. The fungus grew slowly, forming a very much localized growth, with the development after some time of the typical *Marssonia* spores.

* Potebnia, A. Beiträge zur Micromycetenflora Mittel-Russlands. Ann. Myc. 8: 79–81. 1910.

In the autumn of 1907, diseased leaves were enclosed in wire nets and placed out of doors to winter. Being located in Louisiana in the spring of 1908, Mr. C. J. Humphrey, of the Botanical Department of Cornell University, kindly sent me the leaves from the nets, and also others picked up from under the affected white poplar trees. The leaves were received during the last part of



FIGS. 1–5. Asci, spores, and paraphyses of *Trochila Populorum*. × 750. 1. Mature asci. 2. An ascus, showing how the apex is ruptured when the spores are thrown out. 3. Ascospores. 4. Germinating ascospores. 5. Paraphyses and young asci.

April and May. In nearly all of the spots on nearly all of the leaves, there was an abundant development of an ascomycete which I determined as *Trochila Populorum*. Many attempts were made to culture the ascospores in 1908, but without success. The spores would not grow in acid media, and, in dilution cultures using ordinary media, bacteria and molds ruined the plates.

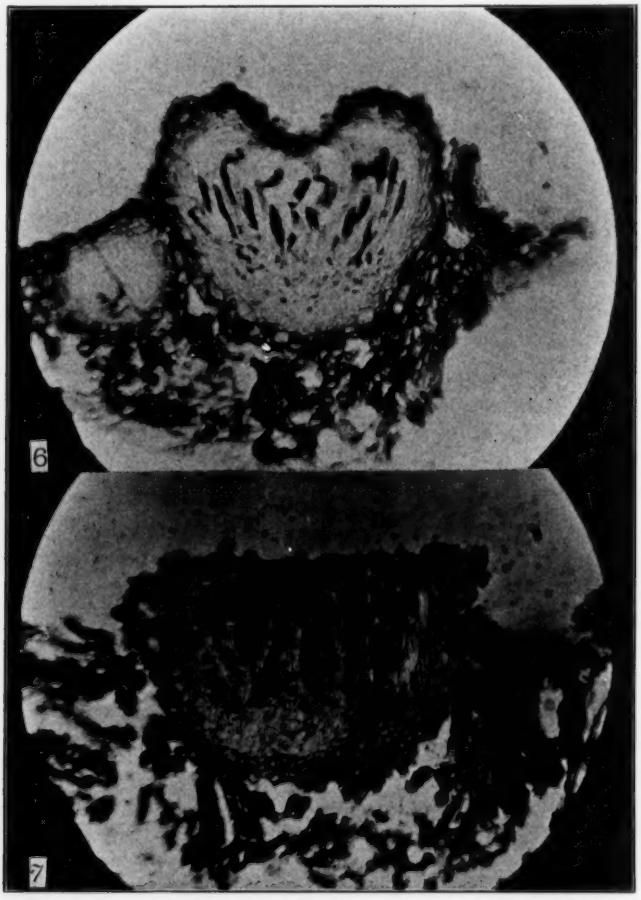
In the season of 1909, material was again sent me from Ithaca, and further attempts were made to culture the spores, though by a different method. The affected leaves were placed in a moist chamber and petri dishes containing sterile agar were inverted over them. As the apothecia opened up, the spores were shot out of the asci into the agar above. These spores germinated and I was able to transfer them to tubes. The germ-tube was sent out either from the side or at the end of the spore (*fig. 4*).

On sterilized bean pods and alfalfa stems, the fungus grew very slowly, finally forming a colony from one to two millimeters in diameter, when all growth ceased. The tubes were kept for nearly a year, some of them being transferred to see if further growth could be obtained. The cultures were examined occasionally, but I was never able to find any two-celled spores in them, being similar in this respect to Potebnia's cultures from the *Marssonia* spores themselves. As the cultures were made in Louisiana, perhaps the high temperature had much to do with the lack of development of the spores. Not being able to find the spores in the cultures, I was not able to prove absolutely the connection between the *Marssonia* and the *Trochila;* but from the fact that the *Trochila* always developed in the *Marssonia* spots, and also from the somewhat similar colonies in pure culture, with the exception of spore formation, it seems very probable that the two forms are connected.

In a letter from Dr. E. J. Durand, he states that *Trochila Populorum* has never been found in America, so far as he knows. This being the case, perhaps a short description may not be out of place.

The apothecia are at first somewhat globose, but as they grow older they generally become more or less flattened and concave at the top (*fig. 6*). The upper portion of the apothecium is forced out of the leaf during its growth, so that at maturity it projects some little distance from the surface of the leaf. The outer layer of the apothecium is composed of a pseudo-parenchymatous tissue of a dark-brown color. Inside of this, there is a more delicate layer of hyaline cells. The outer layer entirely surrounds the developing asci and paraphyses and is not broken apart at the top until the ascospores are nearly mature. In size, the apothecia

are about 90–140 × 100–190 μ. The asci are clavate, 12–14 × 60–80 μ, with the ascus wall thickened at the apex (*fig. 1*). This thickened apex is ruptured when the spores are shot out (*fig. 2*).



FIGS. 6, 7. Apothecia of *Trochila Populorum*. × 330. 6. Young stage. 7. Nearly mature stage.

The spores are hyaline, one-celled, 12–16 × 5–7.2 μ, almost always containing two large guttulae, one at each end of the spore. The paraphyses are very abundant, 80–100, long, narrow, septate, and somewhat broadened at the apex.

It is possible that Potebnia is correct when he believes that this fungus should be placed in the genus *Pseudopeziza*, but, with the present classification, the dark outer layer of cells of the apothecia would cause it to remain in the genus *Trochila*.

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OCCURRENCE OF MONASCUS BARKERI IN BOTTLED PICKLES

CHARLES E. LEWIS

In December, 1909, a white growth of fungous mycelium was observed in a bottle of pickles which had been purchased in Portland, Maine, but which came originally from a Chicago firm. The unopened bottle was placed on a shelf in the laboratory and its examination was neglected until March, 1910. At that time, the upper half of the pickles was covered with mycelium almost pure-white in color.

Some of the material was examined with a microscope and it was found that there were large numbers of fruit-bodies like those of *Monascus*. The writer is familiar with the appearance of both *Monascus Barkeri* Dangeard and *Monascus purpureus* Went, having grown these fungi in cultures for about three years. Plate cultures were made from some of the material from the pickles and the fungus which developed agreed in its characters with *M. Barkeri*. The fungus from the pickles and my cultures of *M. Barkeri*, which were secured originally from the Association Internationale des Botanistes, have been grown on the same culture media under the same conditions for two months and they appear to be identical.

The occurrence of this fungus in a bottle of pickles from Chicago is of interest because the fungus was first described from material from eastern Asia, and, so far as the writer is aware, it has never been reported as occurring in America.

The spores of *Monascus* retain their viability for long periods of time, even when dry, so its occurrence in bottled pickles in this country is probably explained by assuming that the fungus was carried by some of the spices which were used.

AGRICULTURAL EXPERIMENT STATION,
ORONO, MAINE.

NOTES ON NORTH AMERICAN HYPOCREALES—III. TWO NEW SPECIES WITH STUDIES OF THEIR LIFE HISTORIES

FRED J. SEAVER

(WITH PLATE 30, CONTAINING 13 FIGURES)

So little is known of the life histories of the polymorphic species of the present order that any information which can be gained as to the complementary phases where the ascigerous stage is known is of much interest to mycologists. Not only is this true because of the fact that it gives us the knowledge of the life history of the individual species studied, but it furnishes at least a clue as to the direction in which to look for the complementary stages in other species where only the perfect or imperfect stages are known.

In my own studies of the Hypocreales, I have been much interested in the group of so-called imperfect fungi known as the Verticillieae and their perfect stages, several of which have been noted among nectriaceous plants. The Verticillieae are characterized by the verticillately branching conidiophores, the plants resembling in this respect *Penicillium*. The conidia are hyaline and borne either singly or in chains. The conidiophores often spring from a more or less well-developed stromatic base, giving the whole a floccose appearance of a whitish or pinkish color.

Among the Nectriaceae, the first species studied which was found to be associated with a *Verticillium* was *Creonectria ochroleuca* (Schw.) Seaver. This species has proved to be very common and a number of synonyms have been worked out. The examination of the types or cotypes of several of these synonyms has shown them to be associated with a *Verticillium*. Spegazzini seems to have been the first to call attention to the association of this *Nectria* with a *Verticillium* in his description of *Nectria vulgaris* Speg., which species is a synonym of the above. The

conidial stage of this species was also described as *Verticillium tuberculoides* Speg.

Creonectria seminicola Seaver, which, as stated in a previous paper, is closely related to the above, has also a *Verticillium* as its conidial stage.

Nectria Bainii Massee, which occurs an cacao pods in the West Indies, is also associated with a *Verticillium*. Our conclusion is here based on the examination of material collected in the West Indies, the identification of which has been confirmed at Kew and the specimens pronounced to be typical *Nectria Bainii* Massee. This species differs from the two preceding only in the slightly larger ascospores.

Recent studies of two undescribed species of nectriaceous plants, both of which have been found to be associated with Verticillieae, have furnished the data for the present paper.

The first of these, collected in Mexico during the winter of 1910 by Dr. W. A. Murrill, was reported to be a parasite on the stems of an undetermined palm. The original collection showed numerous pinkish stromata covering the stems of the host. A study of the microscopic characters showed the fungus to be one of the Verticillieae, and it was at once suspected that the fungus might be the conidial phase of a *Nectria* or one of the related genera. This suspicion was confirmed by the finding of other specimens of the host with both the conidia and perithecia. The conidia and perithecia were so intimately associated that it seemed likely that they represented two stages in the life history of the same fungus.

The ascospores are of an olivaceous or smoky-brown color, which character would place the fungus in the genus *Macbridella*. This genus was founded by the writer* to include two species of colored-spored, stromatic Nectrieae, both of which were collected in Central America. The occurrence of a new and third species of this genus in Mexico is of interest from the standpoint of distribution. It is also of interest to note that a fourth species which would properly belong to this genus has been reported from South America. These facts would indicate that the genus is composed largely of tropical species. The three North American

* Mycologia 1: 195. 1909.

species reported, while clearly belonging to the same genus, are specifically very different. The fact that this species occurs on the living stems of the host and is apparently connected with a group of fungi which is of some economic importance prompted an investigation of its life history.

CULTURE EXPERIMENTS

Drop cultures were made of the conidia and ascospores and both were found to be in a germinating condition. The ascospores produce usually two germ-tubes, which in twenty-four hours attain considerable length.

The host of the parasite was undetermined, and a small piece of the leaf was the only clue which we had as to its identity. In order to select a suitable host on which to cultivate the fungus, a visit was made to the palm house of the conservatories of the New York Botanical Garden with the hope or finding a plant similar to the fragment brought from Mexico. The leaves of plants of the genus *Chamaedorea* resemble the Mexican specimen, and a species of this genus was selected (*Chamaedorea Sartorii*) which was known to occur in Mexico. Unfortunately, the plants of this genus were not sufficiently abundant in the conservatories to permit of a living plant being used for inoculation, so a leaf was removed and the petiole used in our preliminary experiments.

The petiole was cut into pieces 2–3 inches in length. One of these was split and the inoculations made the full length of the split surface with the conidia from the original collection. The other speicmens were inoculated on the cut ends only. All were placed in test tubes with the lower ends immersed in distilled water. In about ten days, the split stems showed an abundant infection, the conidia being more or less effused and nearly covering the whole of the cut surface. The stromata later appeared on the opposite side of the stem, being at first scattered but later becoming more or less confluent. The color, as in the original specimen, was at first white, becoming pink with age. The plants were identical both in gross appearance and microscopic characters with the specimens from which the inoculations were made.

The specimens which were inoculated on the cut ends only took

the infection more slowly. The stems gradually became blackened, as was also the case in the preceding experiment, the stromata appearing as small pustules near the end of the stem, and gradually spreading down its side.

Other inoculations were made in a similar way on the petioles of the same and other species of *Chamaedorea,* and an abundant infection of the conidia followed in nearly every case. All of the culture material was allowed to remain moist, with the hope of producing perithecia. The latter part of April, about two months from the time of the planting of the conidia, perithecia were observed in two of the cultures, being produced in small clusters or occasionally more or less scattered. Perithecia were later seen in one of the cultures belonging to the second set of inoculations.

Both the perithecia and spores in the culture-grown specimens differed slightly from the original material, but these differences seemed to be due to the fact that the specimens were not properly matured. The perithecia were dull-red in color, while in the original material they were covered with olivaceous granules. The spores, also, were almost destitute of color. However, all of the morphological characters with the exception of the two mentioned above indicate that the species grown in culture is identical with the one from which the inoculations were made. The species may be described as follows:

Macbridella olivacea sp. nov.

Stromata erumpent, with a rather compact center, overtopped by numerous branching conidiophores, giving the whole a loose floccose appearance, at first white, becoming pink, about 1 μ in diameter, scattered or confluent; conidiophores verticillate-branched; conidia borne in chains, ellipsoid, 4–5 $\times$ 5–6 μ; perithecia occurring in cespitose clusters on or surrounding the stroma, dull-reddish, covered with olivaceous granules, giving the clusters a dark, greenish-black color; asci cylindric, 8-spored; spores 1-seriate, with the ends overlapping, fusoid or subelliptic, at first hyaline and surrounded by a transparent envelope, 1-septate, becoming olivaceous or smoky-brown and slightly constricted at the septum, externally marked with coarse striations, giving the surface a roughened appearance, with an oil-drop in each cell, 12–15 $\times$ 8 μ.

Type collected at Motzorongo, Mexico, on the stems of an undetermined wild palm, January 15, 1910, *W. A. Murrill 911.*

DISTRIBUTION: Known only from the type locality.

The second species described in this paper was first observed in the propagating houses of the New York Botanical Garden in

FIG. 1. Colonies of *Nectria zonata* Seaver spreading over green algae on flower pot.

1906, where it was found growing on the surface of soil covered with green algae. It was also later observed on the outside of pots containing living plants, always, so far as observed, spreading over green algae, *Pleurococcus,* etc. During the last two

years it has been under observation on such habitats, as it appeared continuously during this period on various pots in different parts of the propagating houses (*fig. 1*).

The most characteristic feature of the species is the appearance of a scant mycelial growth, which gradually radiates out from a common center and apparently originates from a single infection. As the mycelium proceeds outward, forming concentric rings or zones, it disappears in the center, leaving a bare space surrounded by the gradually enlarging rings of mycelium. The perithecia later appear scattered over the mycelial growth or in the central portion where the mycelium has disappeared. The mycelium is very scant and never, so far as observed, gives rise to a stroma, but at intervals under favorable conditions produces very delicate white tufts of conidiophores bearing conidia. While apparently belonging to the Verticillieae, both conidiophores and conidia are very different from those of the preceding species (*pl. 30*). The characters mentioned above would place this species in the genus *Nectria*. A diagnosis of the species follows.

Nectria zonata sp. nov.

Perithecia preceded by a scant mycelial growth which radiates from a common center, giving rise to concentric rings or zones, finally disappearing in the center, leaving a bare space surrounded by the gradually expanding rings of mycelium, with the conidiophores and conidia appearing as delicate white tufts; conidiophores verticillate-branched, with the conidia-bearing branches enlarged below, gradually tapering toward the apex; conidia borne in chains, fusiform, 10–12 × 5 μ, granular within and often appearing very minutely roughened; perithecia scattered, rarely two together, numerous, pale-orange or flesh-red, becoming slightly darker in dried specimens, under conditions of moisture covered, especially near the base, with a mycelial growth giving the plants a whitish appearance, or entirely naked; ostiolum slightly prominent, entire or rarely collapsing in dried specimens; asci clavate, 8-spored; spores partially 2-seriate or irregularly crowded, unequal-sided, broad-fusoid, 1-septate, slightly constricted at the septum, with the lower of the two cells narrower, filled with numerous oil-drops, hyaline, 17–18 × 8–9 μ.

Type collected in the propagating houses of the New York Botanical Garden on the outside of a pot containing living plants, May 20, 1910, *F. J. Seaver*.

DISTRIBUTION: Known only from the type locality.

EXPLANATION OF PLATE XXX

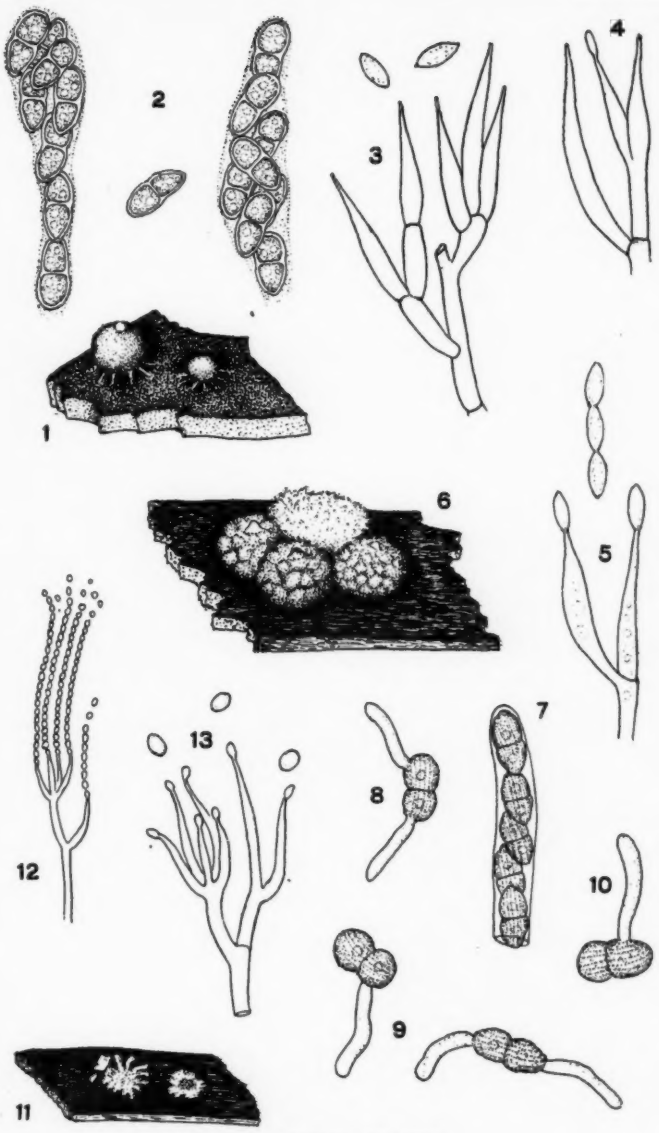
FIGS. 1–5. *Nectria zonata* Seaver

1. Perithecia.
2. Asci and spores.
3–5. Conidiophores and conidia.

FIGS. 6–13. *Macbridella olivacea* Seaver

6. Perithecia and stroma.
7. Portion of an ascus with spores.
8–10. Germinating ascospores after twenty hours in drop culture.
11. Young stromata.
12. Conidiophore and conidia (partially diagrammatic).
13. Conidiophore and conidia.

Figs. 2–5, 7–10, and 13 were drawn with the aid of the camera lucida.



1–5. NECTRIA ZONATA SEAVER
6–13. MACBRIDELLA OLIVACEA SEAVER

THE POLYPORACEAE OF JAMAICA

WILLIAM A. MURRILL

The fungi of Jamaica have been much neglected since the time of Olaf Swartz, who described only a few species, until recent years, when Dr. L. M. Underwood, Professor F. S. Earle, Dr. and Mrs. N. L. Britton, and others, either connected with expeditions sent out by the New York Botanical Garden or registered for investigation at Cinchona, have collected material upon which practically all of our accurate knowledge of the fungi of Jamaica is based.

The following list contains the species of polypores found in Jamaica, with the exception of a few white resupinate forms upon which I am not at present prepared to publish. The numbers here given are my own, unless otherwise stated. Mr. William Harris collected with me in the Cockpit Country. The localities and dates of my collections are as follows:

1. Rocky, shaded ravine east of Hope Gardens, 800 ft., dry region. December 12, 1908.
2. Constant Spring Hotel Grounds and ravines in vicinity, 600 ft., rather dry region. December 13, 1908.
3. Castleton Gardens, 600 ft., wet and shaded. December 14–15, 1908.
4. Moore Town, 100–1000 ft., plantations in lowlands and virgin forests on hills, wet region. December 16, 1908.
5. Blue Hole, Priestman's River, and inland road toward Manchioneal, 10–400 ft., mostly in cocoanut plantations recently established or in pastures, wet region. December 17, 1908.
6. St. Margaret's Bay to Port Antonio, 5–50 ft., wet region. December 18, 1908.
7. Chester Vale, 3000–4000 ft., wet, mountainous region. December 21–24, 1908.
8. Cinchona, 4500–5200 ft., wet, mountainous region. December 25–January 8, 1908–9.
9. Morce's Gap, 5000 ft., very wet, mountainous region; tree ferns and filmy ferns in abundance. December 29, 30, January 2, 1908–9.
10. New Haven Gap, 5600 ft., wet, mountainous region. January 4, 1909.
11. Monkey Hill to Sir John Peak, 5800–6100 ft., very wet, mountainous region. January 5, 1909.
12. Hope Gardens and Constant Spring, 600 ft., lawns and thickets after rains. January 9–10, 1909.

13. Troy and Tyre, Cockpit Country, 2000 ft., wet, wooded, limestone region. January 12–14, 1909.
14. Moneague to Union Hill, 1200–2200 ft., wet, wooded, limestone region. January 17–18, 1909.

Tribe PORIEAE

FOMITIPORELLA UMBRINELLA (Bres.) Murrill, N. Am. Flora 9: 13. 1907. Collected at Rose Hill in 1902 by F. S. Earle, and at Cinchona in 1906 by N. L. Britton.

FOMITIPORIA CINCHONENSIS Murrill, N. Am. Flora 9: 10. 1907. Described from specimens collected at Cinchona in 1902 by F. S. Earle.

FOMITIPORIA CUBENSIS Murrill, N. Am. Flora 9: 8. 1907. This species is usually seen on fence posts, growing in disk-shaped masses nearly an inch thick and several inches across.

Constant Spring Hotel, *36;* Cockpit country, *1046.*

FOMITIPORIA JAMAICENSIS Murrill, N. Am. Flora 9: 11. 1907. Described from specimens collected at Castleton in 1902 by F. S. Earle.

FOMITIPORIA TROPICALIS (Cooke) Murrill, N. Am. Flora 9: 8. 1907. The largest of all the resupinate species, attaining a thickness of nearly two inches and extending for many feet on the under surface of logs.

Priestman's River, *233;* St. Margaret's Bay to Port Antonio, *241.*

Fuscoporella castletonensis sp. nov.

Effused, inseparable, irregular, rigid, corky, 1–2 mm. thick; margin thin, adnate, irregular, fertile, ferruginous: context conspicuous, ferruginous to fulvous; hymenium somewhat uneven, pale-ferruginous to umbrinous; tubes grayish-umbrinous, very short, much less than 1 mm. long, mouths about 7 to a mm., regular, edges thin, entire, rigid: spores ellipsoid, smooth, pale-ferruginous, 4–5 × 2–3 μ; cystidia straight, sharp, ferruginous, fulvous, abundant, 20 μ long, 4–5 μ thick at the base; hyphae ferruginous.

Type collected in Castleton Gardens, Jamaica, 200 m., on dead wood, December 14–15, 1908, *W. A. & Edna L. Murrill 58.*

FUSCOPORIA VITICOLA (Schw.) Murrill, N. Am. Flora 9: 4. 1907.

Found only at high elevations in Jamaica. Abundant in the eastern United States north of Florida.

Chester Vale, *344;* Cinchona, *656;* New Haven Gap, *756.*

Tribe POLYPOREAE

Abortiporus tropicalis sp. nov.

Pileus distorted, spatulate to reniform, laterally stipitate, tough, flexible, becoming almost rigid when dry, 1–2 × 2.5–3 × 0.2–0.4 cm.; surface spongy, finely tomentose, uneven, plane or depressed, rosy-ochraceous, anoderm; margin white, becoming reddish-brown when bruised, undulate to lobed, sterile: context white, duplex, with a firmer layer next to the tubes; tubes short, white within, mouths minute, invisible to the unaided eye, somewhat glistening, white, edges firm, obtuse to subacute, entire: spores globose, smooth, thin-walled, hyaline, copious, 4.5–6 μ: stipe ascending, expanding into the pileus, sometimes branched at the base, very irregular, cremeous, clothed like the pileus, tapering below, about 3 cm. long and 5–10 mm. thick.

Type collected in Hope Gardens, Jamaica, 200 m., attached to the base of a small dead stump, January 9–10, 1909, *W. A. Murrill 836.*

BJERKANDERA ADUSTA (Willd.) Karst. Medd. Soc. Faun. Fl. Fenn. **5**: 38. 1879. All the specimens from the Cockpit Country and one collection from Chester Vale (348) represent a small form, quite different from the usual form of temperate regions, which latter I have from Chester Vale and Cinchona.

Castleton Gardens, *78;* Chester Vale, *303, 348;* Cockpit Country, *890, 915, 974.*

CERRENELLA FARINACEA (Fries) Murrill, N. Am. Flora **9**: 74. 1908.

Chester Vale, *308½;* Cinchona, *412;* Cockpit Country, *844.*

COLTRICIA SPATHULATA (Hook.) Murrill, N. Am. Flora **9**: 93. 1908. Abundant in a grove on a southern slope.

Cockpit Country, *962, 1034, 1059.*

CORIOLELLUS SEPIUM (Berk.) Murrill, Bull. Torrey Club **32**: 481. 1905. This species is represented in Jamacia and Cuba by a darker, more irregular, and less reflexed form than the typical one of the eastern United States.

Chester Vale, *274;* Morce's Gap, *679.*

CORIOLOPSIS CAPERATA (Berk.) Murrill, N. Am. Flora **9**: 77. 1908.

Cockpit Country, *891*.

CORIOLOPSIS FULVOCINEREA Murrill, N. Am. Flora **9**: 76. 1908.

Collected at Hope Gardens and Port Maria by Earle.

CORIOLOPSIS OCCIDENTALIS (Klotsch) Murrill, Bull. Torrey Club **32**: 358. 1905. Abundant throughout the island.

Priestman's River, *209;* Chester Vale, *356;* Cockpit Country, *1114*.

CORIOLOPSIS RIGIDA (Berk. & Mont.) Murrill, N. Am. Flora **9**: 75. 1908.

Abundant throughout the island.

Castleton Gardens, *65;* Preistman's River, *203;* Chester Vale, *280; Cockpit Country, 878, 998;* Moneague to Union Hall, *1121*.

CORIOLOPSIS SUBGLABRESCENS Murrill, N. Am. Flora **9**: 77. 1908.

Collected in the Cockpit Country in 1906 by L. M. Underwood.

CORIOLOPSIS TAYLORI Murrill, N. Am. Flora **9**: 76. 1908.

Morce's Gap, *697*.

CORIOLOPSIS VITTATA (Ellis & Macbr.) Murrill, N. Am. Flora **9**: 76. 1908.

Chester Vale, *292*.

CORIOLUS ARMENICOLOR (Berk. & Curt.) Pat. Tax. Hymén. 94. 1900. Collected at Mandeville by Cockerell. Difficult to distinguish from old and discolored *Coriolus membranaceus*. The type specimens are also much alike. However, I have excellent fresh specimens of *C. armenicolor* from Honduras, collected by M. E. Peck, that show the two species to be quite distinct.

CORIOLUS BRACHYPUS (Lév.) Murrill, Bull. Torrey Club **32**: 646. 1906.

Coriolus effusus sp. nov.

Pileus very thin, flexible, broadly confluent, effused, shortly reflexed, the reflexed portion convex, laterally elongated, projecting 3–7 mm.; surface finely tomentose, white or pale-yellowish, slightly sulcate, especially near the margin, which is broadly sterile, milk-white, undulate: context thin, white, membranous; hymenium very irregular, varying according to the

position of the tubes, white or slightly yellowish; tubes very short, mouths circular or much elongated radially, edges thin, becoming lacerate-dentate or somewhat irpiciform: spores smooth, hyaline.

Collected at Chester Vale, Jamaica, 1100 m., on dead wood, December 22, 1908, *W. A. & Edna L. Murrill 261 (type), 309.*

Cockpit Country, *888, 987, 1001, 1027.*

Coriolus Hollickii sp. nov.

Pileus imbricate, substipitate, attached by a short, scutellate disk or tubercle, flabelliform, flexible to nearly rigid, rather thick for the genus, 4–6 × 5–7 × 0.5 cm.; surface slightly radiate-rugose, multizonate, shallowly concentrically sulcate, opaque, glabrous, ochroleucous or ochraceous to pallid with pale-avellaneous zones; margin subacute, entire, fertile, concolorous: context milk-white, soft-corky, homogeneous, about 2 mm. thick; tubes stramineous within and without, becoming isabelline on drying, 2–3 mm. long, corky, rigid, mouths regular, nearly circular, glistening, 4–5 to a mm., edges thin, entire; spores hyaline.

Type collected at Union Hill, near Moneague, Jamaica, on a log in the woods, April 6–7, 1908, *N. L. Britton & Arthur Hollick 2779.*

CORIOLUS MAXIMUS (Mont.) Murrill, Bull. Torrey Club **34**: 467. 1907. Very abundant throughout the island.

Cinchona, *472;* Cockpit Country, *897.*

CORIOLUS MEMBRANACEUS (Sw.) Pat. Tax. Hymén. 94. 1900. Very abundant throughout the island.

Constant Spring Hotel, *29;* Moore Town, *153, 161;* St. Margaret's Bay to Port Antonio, *243;* Cinchona, *503;* Cockpit Country, *883, 893, 908;* Moneague to Union Hill, *1162.*

CORIOLUS PAVONIUS (Hook.) Murrill, N. Am. Flora **9**: 25. 1907. Abundant throughout the island.

Castleton Gardens, *108;* Priestman's River, *179, 216;* Chester Vale, *317;* Hope Gardens and Constant Spring, *841;* Cockpit Country, *874;* Moneague to Union Hill, *1147, 1148.*

Coriolus pertenuis sp. nov.

Pileus very thin, coriaceous, flexible, dimidiate, nearly plane, sessile by a narrow base, 2.5 × 3 × 0.1–0.2 cm.; surface slightly concentrically furrowed, glabrous, stramineous; margin thin, entire, sterile, cremeous: context white, fibrous, membranous;

hymenium ochraceous when viewed at an angle, nearly fulvous when looked at perpendicularly; tubes punctiform, less than 1 mm. long, mouths very regular, angular, about 5 to a mm., edges thin, entire: spores smooth, hyaline.

Type collected at Chester Vale, Jamaica, 1100 m., on dead wood, December 22, 1908, *W. A. & Edna L. Murrill 397*.

CORIOLUS PINSITUS (Fries) Pat. Tax. Hymén. 94. 1900. Very abundant throughout the island.

Castleton Gardens, *94;* Chester Vale, *318;* Cinchona, *460;* Cockpit Country, *1079;* Moneague to Union Hill, *1168*.

CORIOLUS SECTOR (Ehrenb.) Pat. Tax. Hymén. 94. 1900.

Cinchona, *612;* Cockpit Country, *1091*.

CORIOLUS VERSICOLOR (L.) Quél. Ench. Fung. 175. 1886. Seen only at high elevations. Previously collected on Rose Hill by Earle and on John Crow Peak by Underwood.

Cinchona, *465, 470, 502, 650;* Morce's Gap, *704;* New Haven Gap, *776*.

CYCLOPORELLUS IODINUS (Mont.) Murrill, N. Am. Flora **9**: 85. 1908.

East of Hope Gardens, *9, 11;* Chester Vale, *303½;* Cinchona, *657;* Morce's Gap, *673½;* Monkey Hill to Sir John Peak, *786;* Cockpit Country, *990, 1100*.

FLAVIPORUS RUFOFLAVUS (Berk. & Curt.) Murrill, Bull. Torrey Club **32**: 360. 1905.

Castleton Gardens, *85*.

FUNALIA VILLOSA (Sw.) Murrill, Bull. Torrey Club **32**: 356. 1905.

Cockpit Country, *920, 1119*.

HAPALOPILUS GILVUS (Schw.) Murrill, Bull. Torrey Club **31**: 418. 1904. Abundant throughout the island.

Chester Vale, *257, 279;* Cinchona, *628;* Cockpit Country, *906;* Moneague to Union Hill, *1182*.

HAPALOPILUS LICNOIDES (Mont.) Murrill, Bull. Torrey Club **31**: 417. 1904.

Constant Spring Hotel, *28;* Priestman's River, *222;* Chester Vale, *268, 285;* Cockpit Country, *904, 979, 984*.

HEXAGONA CUCULLATA (Mont.) Murrill, Bull. Torrey Club **31**: 332. 1904. Collected at Hollymount in 1906 by L. M. Underwood.

HEXAGONA DAEDALEA (Link) Murrill, Bull. Torrey Club **31**: 328. 1904.
Cockpit Country, *967, 969, 1042, 1110;* Moneague, *1170.*

HEXAGONA FRAGILIS Murrill, Bull. Torrey Club **31**: 329. 1904. Described from specimens collected at Port Antonio in 1902 by F. S. Earle.

HEXAGONA MAXONI Murrill, N. Am. Flora **9**: 49. 1907. Collected on Blue Mountain Peak in 1903 by L. M. Underwood.

HEXAGONA SUBCAPERATA Murrill, N. Am. Flora **9**: 50. 1907. Described from specimens collected at Port Antonio in 1902 by F. S. Earle.
Castleton Gardens, *54.*

HEXAGONA TESSELLATULA Murrill, Bull. Torrey Club **31**: 330. 1904.
Cockpit Country, *1049.*

INONOTUS CORROSUS Murrill, Bull. Torrey Club **31**: 598. 1904. Collected at Troy in 1906 by L. M. Underwood.

INONOTUS FULVOMELLEUS Murrill, N. Am. Flora **9**: 87. 1908. Described from specimens collected on Blue Mountain Peak in 1903 by L. M. Underwood, who also found it at New Haven Gap and on Sir John Peak. The species is known only from the Blue Mountains, at elevations of 5500 ft., or more.
New Haven Gap, *768;* Sir John Peak, *810.*

INONOTUS JAMAICENSIS Murrill, Bull. Torrey Club **31**: 597. 1904. Described from specimens collected by L. M. Underwood in 1903 on Mabess River, north of Cinchona and about 2000 ft. lower.

IRPICIPORUS LACTEUS (Fries) Murrill, N. Am. Flora **9**: 15. 1907. Previously collected in the Cockpit Country by Underwood and at Cinchona by D. S. Johnson.
Cinchona, *486.*

MICROPORELLUS DEALBATUS (Berk. & Curt.) Murrill, Bull. Torrey Club **32**: 483. 1905. Previously collected at Hollymount by L. M. Underwood.

Morce's Gap, *718;* Sir John Peak, *796;* Cockpit Country, *1074, 1102.*

MICROPORELLUS PORPHYRITIS (Berk.) Murrill, N. Am. Flora **9**: 53. 1907.

Cockpit Country, *1052.*

NIGROPORUS VINOSUS (Berk.) Murrill, Bull. Torrey Club **32**: 361. 1905.

Cockpit Country, *859.*

POGONOMYCES HYDNOIDES (Sw.) Murrill, Bull. Torrey Club **31**: 609. 1904. Very abundant throughout the island.

Cockpit Country, *889;* Chester Vale, *359.*

POLYPORUS ARCULARIUS (Batsch) Fries, Syst. Myc. **1**: 342. 1821. Collected at Hope Hill in 1906 by D. S. Johnson.

POLYPORUS BLANCHETIANUS Berk. & Mont. Ann. Sci. Nat. III. **11**: 238. 1839.

Cockpit Country, *1038;* Moneague, *1132.*

Polyporus praeguttulatus sp. nov.

Pileus subcircular in outline, convex above, nearly plane below, attached by a decurrent base, which causes the sporophore to appear triangular in section, $4 \times 4.5 \times 0.5$–2.5 cm.; surface smooth, latericious, with a coating of fine, grayish tomentum, which disappears in numerous subcircular spots; margin slightly upturned, abruptly acute, concentrically striate, entire, cremeous: context pallid, soft-corky, homogeneous, 1 cm. thick behind; tubes stramineous, 3–4 mm. long, mouths subcircular to angular, larger near the margin, most of them about 3 to a mm., glistening, stramineous, edges thin, entire: spores smooth, ovoid, hyaline, 5–6×2–$3\,\mu$; hyphae hyaline; stipe obsolete.

Type collected in Troy and Tyre, Jamaica, 650 m., on a log in woods, January 12–14, 1909, *W. A. Murrill & W. Harris 1105.*

POLYPORUS SCABELLUS (Pat.) Murrill, N. Am. Flora **9**: 63. 1907. Collected at Morce's Gap in 1906 by D. S. Johnson.

POLYPORUS SUBELEGANS Murrill, N. Am. Flora **9**: 62. 1907.

Moore Town, *148;* Cockpit Country, *971, 986, 997.*

POLYPORUS TRICHOLOMA Mont. Ann. Sci. Nat. II. **8**: 365. 1837.

Common at low elevations on fallen branches and sticks.

Priestman's River, *225;* Hope Gardens & Constant Spring, *831;* Cockpit Country, *889½;* Moneague to Union Hill, *1185.*

PYCNOPORUS SANGUINEUS (L.) Murrill, Bull. Torrey Club **31**: 421. 1904. Very abundant throughout the island.

Morce's Gap, *713;* Cockpit Country, *921, 958.*

RIGIDOPORUS SURINAMENSIS (Miq.) Murrill, Bull. Torrey Club **34**: 473. 1907. Delighting in very wet logs. Difficult to distinguish from small specimens of *Fomes Auberianus.*

Castleton Gardens, *62, 132;* Moore Town, *138;* Priestman's River, *213, 219.*

SPONGIPELLIS LURIDESCENS Murrill, N. Am. Flora **9**: 39. 1907. Described from specimens collected at Hall's Delight in 1902 by F. S. Earle.

TRAMETES CUBENSIS (Mont.) Sacc. Syll. Fung. **9**: 198. 1891.

St. Margaret's Bay to Port Antonio, *254;* Chester Vale, *350;* Cockpit Country, *862, 914;* Moneague to Union Hill, *1161.*

TRAMETES HAVANNENSIS (Berk. & Curt.) Murrill, N. Am. Flora **9**: 44. 1907.

Priestman's River, *196.*

Trametes jamaicensis sp. nov.

Pileus laterally connate, effused-reflexed, the reflexed portion triangular in section, convex above, concave below, corky, rigid, 1–1.5 × 2–5 × 0.5–0.8 cm.; surface slightly uneven, finely tomentose, becoming nearly glabrous, whitish to discolored, opaque, anoderm, azonate; margin subobtuse, entire, fertile, concolorous: context homogeneous, soft-corky, white, 2–3 mm. thick; tubes 2–5 mm. long, rather slender, white within, mouths about 4 to a mm., slightly angular, glistening, edges thin, entire, rigid, white to slightly discolored: spores hyaline; cystidia none.

Type collected near Blue Hole, Jamaica, 60 m., on dead wood, December 17, 1908, *W. A. Murrill 187.*

TRAMETES SUBMURINA Murrill, N. Am. Flora **9**: 43. 1907. More abundant during the rainy seasons, as shown by the collections of F. S. Earle.

Priestman's River, *217, 226, 235;* Castleton Gardens, *102.*

Trametes subscutellatus sp. nov.

Pileus tough to rigid, concave below, convex above, vertically attached, circular in outline, 1 cm. broad, 2 mm. thick; surface nearly smooth, with a thin pellicle, ochraceous, except at the vertex, where it is latericious to castaneous; margin subobtuse or

acute, deflexed, white, entire: context white, firm, fibrous, homogeneous; tubes 1 mm. long, stramineous within and without, mouths regular, 4–5 to a mm., circular to slightly angular, glistening, edges obtuse, entire: spores hyaline; cystidia none.

Type collected between Moneague and Union Hill, Jamaica, 500 m., on dead wood, January 17, 1909, *W. A. & Edna L. Murrill 1129*.

TRICHAPTUM TRICHOMALLUM (Berk. & Mont.) Murrill, Bull. Torrey Club **31**: 608. 1904. Collected at Mansfield near Bath in 1903 by L. M. Underwood.

TYROMYCES CAESIUS (Schrad.) Murrill, N. Am. Flora **9**: 34. 1907. Abundant about Cinchona on dead branches of *Juniperus barbadensis*.

Castleton Gardens, *60;* Cinchona, *453, 479, 541, 554, 572;* New Haven Gap, *778*.

Tyromyces cinchonensis sp. nov.

Pileus imbricate, flabelliform, attached by a narrow base, convex above, concave below, slightly flexible, becoming rigid and fragile when dry, 2.5 × 2.5 × 0.2–0.3 cm.; surface milk-white, becoming suffused with avellaneous or very pale ardesiacous markings, perfectly glabrous, radiate-rugose; margin thin, undulate or eroded, deflexed on drying, concolorous: context white, thin, fibrous, rather tough for the genus; tubes white, much longer than the thickness of the context, averaging about 2 mm., mouths angular, regular, white with an ashy tint, glistening, 5–6 to a mm., edges thin, becoming slightly lacerate-dentate: spores cylindric, curved at times, smooth, hyaline, 4 × 1.5–2.5 μ.

Type collected at Cinchona, Jamaica, 1670 m., on a coniferous log, December 25–January 8, 1908–9, *W. A. & Edna L. Murrill 500*. Also collected at the same time at the base of a dead sapling (*No. 509*).

TYROMYCES LACTEUS (Fries) Murrill, N. Am. Flora **9**: 36. 1907. These specimens differ somewhat from the usual form found in temperate regions and the spores are broader, measuring 3.5–4.5 × 1.5–2.5 μ.

Cinchona, *516*.

TYROMYCES LEUCOMALLUS (Berk. & Curt.) Murrill, N. Am. Flora **9**: 36. 1907.

Cockpit Country, *1108½*.

TYROMYCES PALMARUM Murrill, N. Am. Flora **9**: 32. 1907. Collected at Hope Gardens in 1902 by F. S. Earle.

Tribe FOMITEAE

Amauroderma Brittonii sp. nov.

Sporophores of immense size, two growing side by side and slightly united in the type collection; pileus circular in outline, nearly plane, rather soft when fresh, becoming rigid and fragile when dry, over 30 cm. broad in a dried condition and probably 50 cm. when fresh; surface uneven, somewhat sulcate, castaneous to fuliginous, pelliculose, pruinose, opaque, becoming very much wrinkled and uneven on drying: context punky when dry, avellaneous, homogeneous, bounded above and below by a thin, dark layer about 2 mm. thick; hymenium grayish when fresh, becoming brownish on drying and blackening where bruised; tubes minute, irregular, very short, less than 5 mm., much darker than the context, being dark-fumose in dried specimens, mouths slightly angular, 2–3 to a mm., stuffed when young, edges thin, entire, rigid: spores subglobose, slightly fuscous, finely asperulate, 7–8 μ: stipe subcylindric, short, central, slightly enlarged above and below, harder and more rigid than the pileus, encrusted, avellaneous, pruinose, glabrous, uneven, 10 cm. long, 6 cm. thick, no doubt larger in fresh specimens.

Type collected at Bachelor's Hall, Parish of St. Thomas, Jamaica, on a rotten log, September 15–19, 1908, *N. L. Britton 3630*.

AMAURODERMA RENATUM (Berk.) Murrill, N. Am. Flora **9**: 117. 1908. Collected between Chapelton and Bull Head in 1906 by L. M. Underwood.

ELFVINGIA FASCIATA (Sw.) Murrill, Bull. Torrey Club **30**: 298. 1903.

Cockpit Country, *846*.

ELFVINGIA TORNATA (Pers.) Murrill, Bull. Torrey Club **30**: 301. 1903. Abundant throughout the island. Common on fallen pine logs at Cinchona.

Cinchona, *404, 442, 611;* Cockpit Country, *880;* Moneague to Union Hill, *1156*.

FOMES ANNOSUS (Fries) Cooke, Grevillea **14**: 20. 1885. Seen only in the mountains.

Chester Vale, *305½;* Cinchona, *411, 427, 535*.

FOMES AUBERIANUS (Mont.) Murrill, Bull. Torrey Club **32**: 491. 1905. *Boletus microporus,* of Swartz is probably this species, judging from the fact that the latter is conspicuous and generally distributed.

Castleton Gardens, *119;* Priestman's River, *236*; St. Margaret's Bay to Port Antonio, *250, 253, 255;* Cockpit Country, *919, 1004, 1005.*

FOMES GEOTROPUS Cooke, Grevillea **13**: 119. 1884.

Cockpit Country, *944.*

FOMES OHIENSIS (Berk.) Murrill, Bull. Torrey Club **30**: 230. 1903.

Castleton Gardens, *126;* Chester Vale, *398.*

FOMES SAGRAEANUS (Mont.) Murrill, N. Am. Flora **9**: 96. 1908.

Chester Vale, *302.*

FOMES SUBFERREUS Murrill, N. Am. Flora **9**: 97. 1908.

Cockpit Country, *845, 944, 966, 1015.*

FOMITELLA SUPINA (Sw.) Murrill, Bull. Torrey Club **32**: 365. 1905. This species has been collected also near Kingston and at Bath, but it appears to be much less common in Jamaica than in Cuba and the Gulf States.

Cockpit Country, *910, 1033.*

GANODERMA SUBINCRUSTATUM Murrill, N. Am. Flora **9**: 122. 1908. Described from specimens collected at Hope Gardens in 1902 by F. S. Earle.

Constant Spring Hotel, *25.*

GANODERMA TUBERCULOSUM Murrill, N. Am. Flora **9**: 123. 1908.

Cockpit Country, *871, 1018.*

NIGROFOMES MELANOPORUS (Mont.) Murrill, Bull. Torrey Club **31**: 425. 1904.

Cockpit Country, *930, 982.*

PYROPOLYPORUS CALCITRATUS (Berk. & Curt.) Murrill, N. Am. Flora **9**: 110. 1908.

Cockpit Country, *1044.*

PYROPOLYPORUS CEDRELAE Murrill, N. Am. Flora **9**: 105. 1908. Described from specimens collected at Bluefields in 1902 by F. S. Earle.

Pyropolyporus cinchonensis sp. nov.

Pileus woody, triquetrous, very thick and broadly atached behind, convex, 5–7 × 8–12 × 7–10 cm.; surface horny-encrusted, glabrous, smooth, obscurely zonate, slightly sulcate, umbrinous to bay; margin very obtuse, ferruginous, slightly undulate, sterile: context rather hard, fulvous, zonate in recent layers, 0.5–2 cm. thick; tubes indistinctly stratified, avellaneous when young, becoming avellaneous-umbrinous, rather long and slender, sometimes 5 mm. or more long during a season, mouths minute, stuffed when young, circular, 5 to a mm., avellaneous-umbrinous, edges obtuse, entire: spores subglobose, smooth, pale-ferruginous, uniguttulate, 4 μ; hyphae ferruginous, 3–4 μ; cystidia ferriginous-fulvous, pointed, ventricose, scanty, about 20 μ long and 5–7 μ thick at the base.

Collected at Cinchona, Jamaica, 1500 m., on dead, standing, hardwood trunks in a dense virgin forest, December 25–January 8, 1908–9, *W. A. & Edna L. Murrill 446, 643 (type)*.

PYROPOLYPORUS EXTENSUS (Lév.) Murrill, N. Am. Flora **9**: 110. 1908.

East of Hope Gardens, *5;* Cockpit Country, *892, 913, 993*.

PYROPOLYPORUS DEPENDENS Murrill, N. Am. Flora **9**: 106. 1908.

Cockpit Country, *940*.

PYROPOLYPORUS HAEMATOXYLI Murrill, Bull. Torrey Club **30**: 117. 1903. Described from specimens collected at Paradise in 1902 by F. S. Earle.

Pyropolyporus hydrophilus sp. nov.

Pileus small, woody, undulate, usually laterally attached, 2–3 × 2–4.5 × 2–3.5 cm.; surface uneven, rugose, many times sulcate, bay to chestnut, with fuliginous lines, finely tomentose to nearly glabrous, horny-encrusted; margin subobtuse, melleous, entire: context scarcely 1 cm. thick, woody-punky, deep-ferruginous to fulvous; hymenium glistening, melleous when looked at from the side, olivaceous-umbrinous when viewed perpendicularly; tubes indistinctly stratified, fulvous with a grayish tint, 2–3 mm. long each season, mouths circular, 4–5 to a mm., edges obtuse, entire: spores subglobose, smooth, fulvous, uniguttulate, copious, thick-walled, 3.5–4.5 μ; hyphae ferruginous, fulvous, 4 μ; cystidia none.

Collected at Morce's Gap, Jamaica, 1860 m., on dead, standing saplings, December 29, 30, January 2, 1908–9, *W. A. & Edna L. Murrill 700, 717 (type)*.

PYROPOLYPORUS INFLEXIBILIS (Berk.) Murrill, N. Am. Flora **9**: 104. 1908. Collected on Rose Hill by F. S. Earle, and at Morce's Gap, John Crow Peak, Green River, and Cinchona by L. M. Underwood.

PYROPOLYPORUS JAMAICENSIS Murrill, Bull. Torrey Club **30**: 120. 1903. Described from specimens collected at Port Antonio in 1902 by F. S. Earle.

PYROPOLYPORUS ROBINSONIAE Murrill, N. Am. Flora **9**: 108. 1908. Described from specimens collected on Monkey Hill in 1904 by Miss W. J. Robinson.

PYROPOLYPORUS ROSEOCINEREUS Murrill, N. Am. Flora **9**: 104. 1908.

East of Hope Gardens, *1*.

PYROPOLYPORUS SUBPECTINATUS Murrill, N. Am. Flora **9**: 109. 1908.

Union Hill, *1158*.

Pyropolyporus troyanus sp nov.

Pileus woody, horny-encrusted, ungulate, rarely compressed-ungulate, usually plane below, sessile either by the vertex or laterally, 5–8 × 8–11 × 3–5 cm.; surface many times concentrically sulcate, slightly rimose in very old specimens, bay to nearly black, glabrous, even when young; margin slightly obtuse, entire or slightly undulate, ferruginous, sterile, slightly velvety: context woody, hard, about 1 cm. or less thick, fulvous, penetrated by dendroid markings of a black, horny appearance; tubes rather distinctly stratified, avellaneous-umbrinous, about 3 mm. long each season, mouths minute, about 8 to a mm., circular, fulvous, almost castaneous when young, edges obtuse, entire: spores globose, smooth, pale-yellowish, 3–4 μ; hyphae pale-yellowish; cystidia none.

Collected in Troy and Tyre, Jamaica, 650 m., on a dead log, January 12–14, 1909, *W. A. Murrill & Harris 980 (type) 1051*.

PYROPOLYPORUS UNDERWOODII Murrill, Bull. Torrey Club **30**: 116. 1903. Collected near Kingston in 1906 by D. S. Johnson.

Tribe DAEDALEAE

DAEDALEA AMANITOIDES Beauv. Fl. Oware **1**: 44. *pl. 25*. 1805. Abundant throughout the island.

East of Hope Gardens, *8;* Cinchona, *583;* Cockpit Country, *902*.

GLOEOPHYLLUM BERKELEYI (Sacc.) Murrill, Bull. Torrey Club **32**: 370. 1905.

Castleton Gardens, *70.*

GLOEOPHYLLUM HIRSUTUM (Schaeff.) Murrill, Jour. Myc. **9**: 94. 1903.

Chester Vale, *306½.*

GLOEOPHYLLUM STRIATUM (Sw.) Murrill, Bull. Torrey Club **32**: 370. 1905. Abundant at low elevations. First described by Swartz as *Agaricus striatus.*

Cockpit Country, *1066;* Moneague to Union Hill, *1171.*

LENZITES EARLEI Murrill, N. Am. Flora **9**: 128. 1908. Described from specimens collected at Port Antonio in 1902 by F. S. Earle.

NEWS AND NOTES

Cornell University has received an appropriation for three new buildings for the New York State College of Agriculture.

Dr. C. B. Plowright, a distinguished English naturalist, who devoted much of his time to the study of fungi, died early in May, at the age of fifty-one years.

Dr. E. Linhard and Dr. Kølpin Ravn, of Denmark, are visiting America to observe methods of forage crop production and applied plant pathology.

An international American scientific congress will be held in Buenos Aires from July 10 to 25, in celebration of the centenary of the revolution of May, 1810.

Dr. E. P. Meinicke has been called to Washington as expert in the Office of Investigations in Forest Pathology, Bureau of Plant Industry. This office has undertaken a vigorous campaign against forest diseases.

A very important paper by A. Potebnia on the microscopic fungi of middle Russia, containing many species not previously described and many figures, appeared in the February number of *Annales Mycologici*.

A list of the lichens of Ohio, by J. C. Hambleton, appeared in the *Ohio Naturalist* for January, 1910.

A. Sartory has investigated two species of *Chanterel, C. tubaeformis* Fr. and *C. aurantiacus* Wulf., supposed to be poisonous, and has come to the conclusion that they are harmless (Bull. Soc. Myc. Fr. **25**: 253, 254. 1909).

Mr. E. Bartholomew, of Stockton, Kansas, visited the Garden on June 3 and 4.

Dr. J. E. Kirkwood, research scholar at the Garden at various times from 1899 to 1904, has been appointed professor of botany and forestry at the University of Montana.

Dr. Charles E. Fairman, of Lyndonville, New York, spent two weeks at the Garden during the latter part of May, consulting the collection of Lophiostomaceae.

In the *Thesaurus* recently completed by Lindau & Sydow, there are 1710 pages, containing about 30,000 titles of books and articles on mycological subjects.

A number of new species of fungi from the Philippine Islands are described by H. & P. Sydow in *Annales Mycologici* for February, 1910.

A key to the New England species of *Cladonia,* and a list of the species of the Cladoniaceae occurring in New England, prepared by L. W. Riddle, appeared in *Rhodora* for November, 1909.

In the *Plant World* for September, 1909, V. W. Pool discusses the present status of plant pathology; the article being based upon replies to a circular letter to a number of men prominent in this field.

At the recent Brussels' congress, it was decided to take the date of publication of Fries' *Systema Mycologicum* as the starting point for the nomenclature of most of the fungi, and to go back to 1753 for the lichens, and to 1801 for certain other groups.

Professor H. J. Banker, of De Pauw University, Greencastle, Indiana, stopped at the Garden two weeks in June on his way to visit the principal European herbaria in preparation of a monograph of the Hydnaceae to appear in North American Flora.

Mr. H. S. Jackson, research scholar at the Garden in 1907, has been appointed professor of botany and plant pathology in the Oregon Agricultural College. Mr. Jackson has been since August, 1909, research assistant in plant pathology in the Oregon Agricultural Experiment Station.

The Torrey Botanical Club has arranged a special excursion for fungi to Cold Spring, Long Island, for August 6. The train leaves the foot of East 34th Street (Long Island R. R.) at 9:00 A. M. Returning trains leave at 4:49 and 6:51 P. M. Cost of trip, about two dollars. Guides, Mr. Seaver and Mr. Dodge.

Dr. William J. Gies, consulting chemist of the New York Botanical Garden, will conduct investigations of various species of poisonous fungi during the coming year. Contributions of specimens are desired from as many localities as possible. They should be collected in quantity and dried in the sun or in a current of warm air. Descriptive notes are of value for purposes of determination.

An illustrated work on the poisonous plants of Germany, by Dr. P. Esser, director of the Cologne Botanic Garden, has recently appeared. The fungi included in this work are: *Amanita phalloides, A. muscaria, A. pantherina, Russula emetica, R. foetens, Lactarius torminosus, Boletus lupinus, B. Satanas, Phallus impudicus, Scleroderma vulgare,* and *Claviceps purpurea.*

The American Phytopathological Society at its last meeting appointed a committee consisting of F. L. Stevens, H. von Schrenk, E. M. Freeman, W. A. Orton, and G. P. Clinton, to draw up rules and make recommendations concerning the common names of plant diseases, the object being to secure uniformity in their usage.

Leaf-blight of the plane-tree (*Gleosporium nervisequum*) was very conspicuous this season on the grounds of the Garden from the middle of May to the end of June, the continued rainy weather being especially favorable to the development of the

fungus. This severe attack, following so closely the epidemics of 1907 and 1908, will undoubtedly kill or severely injure many of the smaller branches of the plane-trees in this region.

Bulletin 118 of the Bureau of Plant Industry, United States Department of Agriculture, contains the results of four years of research in "Culture Studies of Species of *Penicillium*" by Dr. Charles Thom, mycologist in cheese investigation. Twenty-seven species and three varieties are described in this paper. In addition to morphological characters, the physiological effects upon nutrient media have been found to be reliable characters in separating some species and in such cases are introduced into the diagnoses of the species. The work is illustrated by thirty-six figures.

James B. Rorer, mycologist of the Board of Agriculture of Trinidad, has recently been investigating several diseases that threaten the cacao, cocoanut, and banana industries of the American tropics (see Bull. Trinidad Dep. Agric. no. 64. 1910, and Trinidad Agric. Soc. Paper 412). Mr. Rorer believes that thorough sanitation, by burning in the dry season and burying in rainy weather, is the best means of combatting the bud-rot disease of cocoanut palms; and he recommends the passage of an ordinance compelling all owners of cocoanut plantations to destroy trees affected with this disease.

An extended report of the Boston meeting of the American Phytopathological Society, by Dr. C. L. Shear, secretary, appeared in *Science*, May 13 and May 20, 1910. The Society was organized with 130 charter members, and 50 of these were present at the meeting. Three sessions were devoted to the reading of papers, abstracts of which appear in the secretary's report. Among the many interesting things brought forward, the following may be mentioned:

Puccinia Malvacearum on the hollyhock may be readily communicated by artificial inoculation to *Malva rotundifolia*, or *vice versa*.—Malnutrition diseases of cabbage, spinach, and other vegetables in trucking sections along the Atlantic coast, apparently

due to abnormal quantities of acids in the soil, may be prevented by the application of calcium carbonate.—The smuts of the *Tilletia* group appear to be more nearly related to the rusts than those of the *Ustilago* group.—The present range of the chestnut canker, *Diaporthe parasitica,* is from Saratoga County, N. Y. and Suffolk County, Mass., to Westmoreland County, Pa. and Greenbriar and Preston Counties, W. Va.—A very large part of the potato rot in the United States is due to *Bacillus phytophthorus* Appel.

The Central American banana blight, which has become very serious in recent years, may be retarded in its early stages by replacing diseased plants with healthy ones, but the hope of continuing the banana industry in affected districts lies in the substitution of an immune Chinese variety for the Martinique variety now commonly cultivated.—Lettuce sclerotiniose may probably be eradicated by the early destruction of affected plants, thus preventing the formation of sclerotia.—An anthracnose of red clover (*Gleosporium caulivorum*) spreads rapidly during warm, showery weather when succulent growth is produced.—It is probable that ascospore infection is, in most cases, largely responsible for early attacks of apple scab on the leaves and petioles.—It has been found that *Polystictus hirsutus* Fr. may slowly attack the cambium of mountain ash, gradually killing the tree.—It is possible that there are two banana diseases in tropical America confused, one due to bacteria and the other to a *Fusarium.*

The appearance of *Mycogone perniciosa* Magnus in mushroom beds in Pennsylvania introduces a serious menace to mushroom growing in America.—*Phytophthora Cactorum,* long known to ginseng growers in Japan, has appeared in Ohio and New York, and has been successfully isolated and inoculated into ginseng plants.—Floret sterility of wheat in the Southwest is largely due to rusts and associated fungi, chiefly an undescribed species of *Stemphylium,* distributed by minute insects and the wind at the period of flowering.—A new disease of the tomato plant, due to *Bacterium* (?) *michiganense* E. F. Smith, has been found prevalent in the vicinity of Grand Rapids, Mich.—The use of sulfur to control potato scab in California has resulted in injury to the

tubers, producing sunken, dark spots 5–30 mm. in diameter.—A stem-rot of beans due to *Rhizoctonia* has been observed near Oneida, N. Y.

The Genus Sphaerosoma.—Prof. W. A. Setchell, of the University of California, has recently published a paper on "The Genus Sphaerosoma" (Univ. of Calif. Pub. **4**: 107–120, *pl. 15*). This paper is the outgrowth of the study of specimens of a new fungus collected in California which at first seemed to belong to the genus *Sphaerosoma*. The following is a brief synopsis of his conclusions:

The genus *Sphaerosoma* was founded by Klotzsch in 1839, *Sphaerosoma fuscescens*, an echinulate-hyaline-spored species being the type of the genus. A second species, *Sphaerosoma ostiolatum*, was described by Tulasne in 1851. This species is characterized by the brown-bluntly-tuberculate ascospores. In 1854, Zobel in the sixth volume of Corda's Icones Fungorum established a new genus, *Sphaerozone*, for *Sphaerosoma ostiolatum* Tul., which was described under the name *Sphaerozone Tulasnei* Zobel. In 1885, Hesse described a third species, *Sphaerosoma fragile*. In 1903, Hennings described, under the name *Ruhlandiella berolinensis*, a fungus which he considered close to *Sphaerosoma*, with reticulate-verrucose spores. In 1905, Seaver described a fourth species of *Sphaerosoma* under the name of *Sphaerosoma echinulatum*. In 1905, Rehm distributed (Ascom. *1601*) specimens from upper Silesia under the name of *Sphaerosoma echinulatum* Seaver. In 1908, Rouppert described a fourth species of *Sphaerosoma* under the name of *Sphaerosoma Janczewskianum*, and in 1909 published a monograph of the genus *Sphaerosoma* in which he recognized four species as belonging to the genus *Sphaerosoma*, one of which has reticulate spores, one verrucose spores, and two echinulate spores.

Setchell believes that the genus *Sphaerosoma* should be restricted to the echinulate-spored species, *Sphaerosoma fuscescens* Klotzsch (the type of the genus) and *Sphaerosoma echinulatum* Seaver, and that, since the European form of *Sphaerosoma echinulatum* differs from the American in having shorter and more slender spore-spines, it may come to be regarded as a

distinct species or may be only a geographical variety of the Iowa species.

The genus *Sphaerozone* Zobel should include the brown-verrucose-spored species, *Sphaerozone ostiolatum* (Tul.) Setchell. The new combination is published by Setchell, since, although the genus was based on this species, it was included by Zobel under the name *Sphaerozone Tulasnei.*

The genus *Ruhlandiella* was described by Hennings and based on a brown-reticulate-spored species, and, as stated above, was thought by Hennings to be closely related to *Sphaerosoma.* The Californian specimens are made the basis of a new species belonging to this genus, which is published by Setchell under the name *Ruhlandiella hesperia.*

From his study of the specimens of *Sphaerosoma* (in its restricted sense), Setchell believes that the plants of the genus are hemicleistocarpous and therefore belong more properly with the Pezizineae than with the Helvellineae, as has formerly been thought, and, since the plants have a weakly developed peridium, he suggests a possible relationship with the Pyronemaceae rather than with the Pezizaceae—F. J. SEAVER.